Higher National Unit specification

General information

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

Unit code: H6X3 33

Superclass: XM

Publication date: March 2014

Source: Scottish Qualifications Authority

Version: 01

Unit purpose

The Unit is aimed at learners working within the Electronic Fire and Security Systems Industry or those with an interest in gaining employment within the sector.

The Unit is designed to enable the learner to develop a general knowledge and understanding of the technology used in the installation of CCTV systems and the relevant regulations and standards.

This Unit forms part of the PDA in Providing Electronic Fire and Security Systems. This PDA provides underpinning knowledge and skills for the SVQ level 3 in Providing Electronic Fire and Security Systems at SCQF level 6. The SVQ forms part of the Modern Apprenticeship in Electronic Security Systems.

Outcomes

On successful completion of the Unit the learner will be able to:

1 Explain the role of the CCTV sector and the current standard and industry codes of practice as defined by inspectorate bodies and trade associations.
2 Describe the types of systems and circuits used in CCTV systems.
3 Describe and demonstrate the operation of cameras, lenses and monitors.
4 Describe and demonstrate the functions of control and recording equipment.

Credit points and level

1 Higher National Unit credit at SCQF level 6: (8 SCQF credit points at SCQF level 6)

Higher National Unit specification: General information (cont)

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

Recommended entry to the Unit

While entry is at the discretion of the centre, learners would normally be expected to have attained the following:

F3GF 11 *Numeracy* (Core Skill Unit), SCQF level 5

or

C100 11 *Mathematics: Mathematics 1, 2 and 3* (Intermediate 2), SCQF level 5

or

C101 11 *Mathematics*: Mathematics 1, 2 and Applications (Intermediate 2) SCQF level 5

or

2500 Standard Grade *Maths* (Credit), SCQF level 5

together with:

F3GB 11 *Communication* (Core Skills Unit), SCQF level 5

or

C270 11 *English* (Intermediate 2), SCQF level 5

or

0860 Standard Grade *English* (Credit), SCQF level 5

Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes for this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Equality and inclusion

This Unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**.

Higher National Unit specification: Statement of standards

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Outcome 1

Explain the role of the CCTV sector and the current standard and industry codes of practice as defined by inspectorate bodies and trade associations.

Knowledge and/or Skills

- CCTV standards and codes of practices, including BS EN 50132 and NCP 104
- The CCTV sector within the security industry
- Relevant response organisations, inspectorate bodies and trade associations

Evidence Requirements

The learner should provide oral and/or written evidence to satisfy the Evidence Requirements.

There is no sampling in this Outcome. All aspects of Knowledge and Skills must be assessed.

The standard and quality of the evidence produced by the learner should be reflective of SCQF level 6 and demonstrate a detailed knowledge and understanding of all items in the Knowledge and Skills Section.

For this Outcome, each learner will:

- explain correctly the main standards and codes of practice for CCTV, including BS EN 50132 and NCP 104.
- explain correctly the role of the CCTV sector within the security industry.
- explain correctly the roles of relevant response organisations, inspectorate bodies and trade associations.

The summative assessment tasks for Outcome 1 will be undertaken in closed-book, timed and supervised conditions. All summative tasks must be unseen. Learners are not allowed to use reference sources. Approximately one hour should be allocated to the summative assessment of Outcome 1.

Higher National Unit specification: Statement of standards (cont)

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

Outcome 2

Describe the types of systems and circuits used in CCTV systems.

Knowledge and/or Skills

- Transmission systems, their uses and limitations, including analogue, digital, infra-red, microwave systems and internet protocol
- The main features of telemetry control systems, including pan, tilt, zoom, binary control, pulse code modulation and carrier frequency, hardwire control

Evidence Requirements

The learner should provide oral and/or written evidence to satisfy the Evidence Requirements.

There is no sampling in this Outcome. All aspects of Knowledge and Skills must be assessed.

The standard and quality of the evidence produced by the learner should be reflective of SCQF level 6 and demonstrate a detailed knowledge and understanding of all of items in the Knowledge and Skills Section.

For this Outcome, each learner will:

- describe correctly the uses and limitation of transmission systems.
- describe correctly the main features of telemetry control systems.

The summative assessment tasks for Outcome 2 will be undertaken in closed-book, timed and supervised conditions. All summative tasks must be unseen. Learners are not allowed to use reference sources. Approximately one hour should be allocated to the summative assessment of Outcome 2.

Higher National Unit specification: Statement of standards (cont)

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

Outcome 3

Describe and demonstrate the operation of cameras, lenses and monitors.

Knowledge and/or Skills

- Basic components of video signals, including DVR, transmission systems, monitor, camera, lens, iris, CCD (charged-coupled device)
- The set up procedure for cameras, lenses and monitors

Evidence Requirements

The learner should provide oral and/or written evidence to satisfy the Evidence Requirements.

There is no sampling in this Outcome. All aspects of Knowledge and Skills must be assessed.

The standard and quality of the evidence produced by the learner should be reflective of SCQF level 6 and demonstrate a detailed knowledge and understanding of all of items in the Knowledge and Skills Section.

For this Outcome, each learner will:

- identify, describe and compare correctly basic components of video signals, including DVR, transmission systems, monitor, camera, lens, iris, CCD (charged-coupled device).
- describe correctly the set up procedure for cameras, lenses and monitors.
- demonstrate correctly the set up procedure for a CCTV camera, lens and monitor.

The summative assessment tasks for Outcome 3 will be undertaken in closed-book, timed and supervised conditions. All summative tasks must be unseen. Learners are not allowed to use reference sources. Approximately one hour should be allocated to the summative assessment of Outcome 3.

Higher National Unit specification: Statement of standards (cont)

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

Outcome 4

Describe and demonstrate the functions of control and recording equipment.

Knowledge and/or Skills

- Functions of video recording systems; including frames per second, user set up, night recording, manual recording, 24/7 recording, intruder recording, formatting hard drive recorders, setting the recording resolutions
- Multiplexed CCTV systems
- Digital/Network video recording systems

Evidence Requirements

The learner should provide oral and/or written evidence to satisfy the Evidence Requirements.

There is no sampling in this Outcome. All aspects of Knowledge and Skills must be assessed.

The standard and quality of the evidence produced by the learner should be reflective of SCQF level 6 and demonstrate a detailed knowledge and understanding of all of the items in the Knowledge and Skills Section.

For this Outcome, each learner will:

- describe correctly the features of video recording systems.
- describe correctly multiplexed systems.
- set up correctly a digital/network video recording system; install four cameras with the recording frame rate of 25–35 fps.

The summative assessment tasks for Outcome 4 will be undertaken in closed-book, timed and supervised conditions. All summative tasks must be unseen. Learners are not allowed to use reference sources. Approximately one hour should be allocated to the summative assessment of Outcome 4.

Higher National Unit specification: Statement of standards (cont)

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

For all Outcomes

Centres should devise Instruments of Assessment that will allow the learner to meet the Evidence Requirements for the Outcome to the required standard (See *Guide to Assessment*). It is recommended that centre devised Instruments of Assessment are prior verified by SQA.

Assessment for this Unit can be carried out at the discretion of the centre in the following ways:

- Outcome by Outcome
- Combining Outcomes
- One holistic assessment of the Unit

Suggestions for approaches to assessment can be found in the Support Notes of this Unit. As this is a 40 hour Unit, approximately four hours should be dedicated to summative assessment for the entire Unit.

Higher National Unit Support Notes

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

Unit Support Notes are offered as guidance and are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

This Unit forms part of the PDA in Providing Electronic Fire and Security Systems. This PDA provides underpinning knowledge and skills for the SVQ level 3 in Providing Electronic Fire and Security Systems at SCQF level 6. The SVQ forms part of the Modern Apprenticeship in Electronic Security Systems.

Although not directly awarded, completion of the Modern Apprenticeship Award gives opportunities to apply for professional recognition through the Institute of Engineering Technology and successful recognition will result in the EngTech qualification being awarded.

It may be possible to progress from the Modern Apprenticeship to other qualifications.

Centres should ensure that learners are presented with sufficient theoretical information to succeed in the assessment of this Unit.

Outcome 1

This Outcome covers the necessary underpinning knowledge and skills relating to the industry standards and codes of practices for CCTV installation and the role of CCTV systems in the security sector.

Learners are required to have an understanding of the main points of the current industry standards (British and European) and codes of practice that are currently used for CCTV, this should include BS EN 50132 and NCP 104. Emphasis should be on the set up procedure of CCTV systems and the importance of the use of the Rotakin test.

The use of CCTV systems as deterrents and enhancements to other security systems such as intruder, access control and fire alarms should be described to the learner. The role of CCTV systems and how it prevents and deters criminal activity should also be explained.

The roles of relevant organisations should be explained to the learner. This should include:

- Crowd control/user advice organisations
- Centre for Applied Science and Technology
- Police Scotland
- National Security Inspectorate (NSI)
- Security Systems and Alarms Inspection Board (SSAIB)
- British Security Industry Association (BSIA)

Outcome 2

Learners should have an understanding of the use and limitations of transmission systems used to transmit CCTV images. This should include:

- Coaxial cabling
- Twisted pair
- Fibre optic
- Microwave
- Infra red
- IP ethernet

With regards to the different transmission systems used in CCTV, learners should understand that the length of cable runs and type of transmission system used, may have an adverse effect on the quality of the signal, picture and reliability of the recorded image.

The main features of telemetry control for CCTV should be explained to the learner and include:

- Pulse code modulation
- Carrier frequency
- Hardwire control
- Pan
- Tilt
- Zoom
- Binary control

Higher National Unit Support Notes (cont)

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

Outcome 3

This Outcome covers the necessary underpinning knowledge and skills relating to the basic operation of CCTV cameras.

Learners should have an understanding of the basic components of the video signal, including video transmission, composite video signals, use of Y/C connectors, the component video signals, luminance and chrominance, relative bandwidths, synchronisation pulses and colour burst signal.

Learners should be shown video signals via an oscilloscope. The maximum and minimum peak to peak voltages should be explained.

Learners should be taught the basic setup procedures for, lenses, cameras and monitors. This should include lens formats and types (aspherical, fixed, varied, telephoto, wide angled auto iris, direct drive infra-red corrected).

Learners should gain a knowledge of camera formats, setup of backlight compensation, automatic gain control, white balance and focus.

Learners should also gain an understanding of the basic principles of the cathode ray tube, video inputs, and impedance matching. Monitor size, resolution, ergonomics and common faults should also be covered.

Outcome 4

This Outcome covers the necessary underpinning knowledge and skills relating to the use and set up procedures for analogue and digital video recording.

Learners should have a basic understanding of the features of video recording systems and the importance of setting up the recording equipment as per specification and insurance requirements, features that should be discussed are:

- Frames per second — 25 fps, 35 fps.
- User set up — User accounts, passwords.
- Night recording
- Manual recording
- 24/7 recording
- Motion detection recording
- Formatting hard drives
- Recording resolutions — CIF, 2CIF, D1, 2MP, 4MP, 8MP

Higher National Unit Support Notes (cont)

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

Learners should have a basic understanding of the principle of video recording systems, such as time lapse recording via digital, analogue and network recorders. The principles of data storage for recording devices and the different formats used for recording should also be covered. For example:

- H 264
- H 265
- MPEG 4
- MJPEG

Learners should understand converting analogue signal for storage as digital multiplexed signals for storage and the reverse process for displaying and manipulating signals.

Guidance on approaches to delivery of this Unit

This Unit can be delivered as a free-standing Unit or as part of a Group Award. This Unit is a mandatory Unit in the PDA Providing Fire and Electronic Security Systems and is designed to give learners the underpinning knowledge and skills to support the SVQ level 3 in Providing Electronic Fire and Security Systems. The SVQ forms part of the Modern Apprenticeship in Electronic Security Systems.

A variety of delivery approaches could be adopted in this Unit and, although there is no preferred order of teaching, a systematic approach is recommended. Practitioners should use their professional judgement in designing and delivering the Unit so that it is appropriate, relevant and motivating for individual learners. Approaches should be learner-centred, participative and practical, for example, group activities, one-to-one tutorials, differentiated learning materials and visual aids.

Links in this Unit should be made to the National Occupational Standards (NOS) for the Electronic Security Systems Sector and in particular:

SFS SYS 11	Test and confirm operation of electronic security systems
SFS SYS 10	Install electronic security systems
SFS SYS 12	Commission electronic security systems
SFS SYS 6	Plan the installation of electronic security systems
SFS SYS 8	Make preparations and arrangements to install electronic security systems

Learners could use information or resources acquired during this Unit to help with the completion of the above NOS.

It is recommended that use of a wiki or similar should be encouraged to allow learners to share knowledge and research findings.

Higher National Unit Support Notes (cont)

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

Where resources permit, centres should use technology as much as possible to support learning, teaching and assessment. This could include, for example:

- Compiling and maintaining e-portfolios
- Web-based research
- Game based learning
- Using chat rooms for discussion
- Using virtual learning environments
- Submission of assessed work through VLE, e-mail

The learning and teaching approaches used should encourage learners to be aware of the Knowledge and/or Skills gained, to retain these and use in other contexts.

Guidance on approaches to assessment of this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

Centres should create formative assessments that are both appropriate to the individual's needs and which also prepare the learner for summative assessment. Summative assessment should only take place when the learner has developed the knowledge and skills at the required level for the Unit.

Lecturers should provide adequate opportunities for informal assessment to take place prior to learners undertaking summative assessments. Lecturers may give learners advice and support during any informal assessment in order to prepare them for summative assessment.

Centres may use the Instruments of Assessment which are considered by lecturers to be most appropriate. Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that could be transferable to work or further and higher education.

A range of different assessment methods could. Suggested examples can be found in SQA's Guide to Assessment.

Records of all assessment instruments used and evidence produced by each learner for summative assessment purposes — oral/written/practical — must be retained for internal and external verification purposes.

Practical evidence can be either:

- Assessor checklist with oral questioning
  or
- Photographic/video evidence

All learner evidence must be signed and dated by the assessor thus ensuring authentication.

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at **www.sqa.org.uk/e-assessment**.

Opportunities for developing Core and other essential skills

There is no automatic certification of Core Skills in this Unit. However, there are opportunities to develop aspects of Core Skills in *Communication* (Written and/or Oral), *Problem Solving* (Critical Thinking and Planning and Organising), *Information and Communication Technology (ICT)* (Accessing Information) and *Working with Others* (Working Co-operatively with Others).

Communication: Oral Communication

The Core Skill component Oral Communication at SCQF level 6 could be developed in this Unit. The general skill for this component is — *Produce and respond to oral communication on a complex topic.* This component could be developed through participating in discussions, one-to-one dialogues and group work for both formative and summative assessment purposes. Tasks involving group activities and joint feedback sessions would offer the learner opportunities to make a contribution to a discussion on a complex topic. This could be achieved during a class project when learners discuss their research findings.

Communication: Written Communication

The Core Skill component Written Communication (Writing) at SCQF level 5 could be developed in this Unit. The general skill for this component is — *Produce well-structured written communication.* This component could be developed through research activities and the production of reports, essays or other forms of written communication Some learners may develop this skill at SCQF level 6.

Higher National Unit Support Notes (cont)

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

Problem Solving: Critical Thinking

The Core Skill component Critical Thinking at SCQF level 5 could be developed in this Unit. The general skill for this component is — *Analyse a situation or issue.* This component could be developed where a situation or issue has arisen in the course of the learner's work or study. The learner would need to analyse and evaluate the situation or issue and devise a strategy to deal with it. The learner should reflect on and evaluate the success of the strategy. Alternatively, the tutor could provide a case study.

Problem Solving: Planning and Organising

The Core Skill component Planning and Organising at SCQF level 5 could be developed in this Unit. The general skill for this component is — *Plan, organise and complete a task*. This component could be developed through planning, organising and completing a task. The learner would need to develop a plan, identify and obtain the required resources and then carry out the task. Resources could include, for example, time available, paper work and documentation, set procedures, people and equipment. The learner must decide on how the task will be managed. This could include allocation of responsibilities in a group context. Planning and organising skills could be developed through the completion of home study, research and practical tasks.

Working with Others: Working Co-operatively with Others

The Core Skill component Working Co-operatively with Others at SCQF level 6 could be developed in this Unit. The general skill for this component is — *In complex interactions, work with others co-operatively on an activity and/or activities.* This component could be developed by gathering evidence from the workplace or by taking part in group activities in the centre. This could include, for example, joint information and feedback sessions, group research or practical activities.

Information and Communication Technology (ICT): Accessing Information

The Core Skill component Accessing Information at SCQF level 6 could be developed in this Unit. The general skill for this component is — *Use ICT independently to carry out complex searches across a range of tasks.* This component could be developed by carrying out searches and accessing information for tasks in the Unit. This could involve some searching on complex tasks on unfamiliar information.

Other Essential Skills developed through the completion of this Unit

- Time Management: through the completion of projects and research tasks the learner will acquire new skills in how to manage their own time to help achieve a common goal.

History of changes to Unit

Version	Description of change	Date

General information for learners

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

The Unit is aimed at learners working within the Electronic Fire and Security Systems Industry or those with an interest in gaining employment within this sector.

The Unit is designed to enable the learner to develop a general knowledge and understanding of the technology used in the installation of CCTV systems and the regulations and standards that apply to these systems.

This Unit forms part of the PDA in Providing Electronic Fire and Security Systems. This PDA provides underpinning knowledge and skills for the SVQ level 3 in Providing Electronic Fire and Security Systems at SCQF level 6. The SVQ forms part of the Modern Apprenticeship in Electronic Security Systems.

On completion of the Unit you will be able to:

You will participate in class lectures, group activities and home study in order to widen your understanding of the standards, technology and installation techniques used in the installation of CCTV.

On completion of the Unit you will be able to:

1 Explain the role of the CCTV sector and the current standard and industry codes of practice as defined by inspectorate bodies and trade associations.
2 Describe the types of systems and circuits used in CCTV systems.
3 Describe and demonstrate the operation of cameras, lenses and monitors.
4 Describe and demonstrate the functions of control and recording equipment.

You will participate in class lectures, group activities and home study.

There are different ways in which you can be assessed. Questions will be generated to test your knowledge and understanding. Practical exercises will be used to assess your skills.

Opportunities for developing Core and other essential skills

There is no automatic certification of Core Skills in this Unit. However, there are opportunities to develop aspects of Core Skills in *Communication* (Oral and Written Communication), *Problem Solving* (Critical Thinking and Planning and Organising)*, Information and Communication Technology (ICT)* (Accessing Information) and *Working with Others* (Working Co-operatively with Others).

General information for learners (cont)

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

Communication: Oral Communication

The Core Skill component Oral Communication at SCQF level 6 could be developed in this Unit. The general skill for this component is — *Produce and respond to oral communication on a complex topic.* This component could be developed through participating in discussions, one-to-one dialogues and group work for both formative and summative assessment purposes. Tasks involving group activities and joint feedback sessions would offer you opportunities to make a contribution to a discussion on a complex topic. This could be achieved during a class project when you discuss your research findings.

Communication: Written Communication

The Core Skill component Written Communication (Writing) at SCQF level 5 could be developed in this Unit. The general skill for this component is — *Produce well-structured written communication.* This component could be developed through research activities and the production of reports, essays or other forms of written communication. You may develop this skill at SCQF level 6.

Problem Solving: Critical Thinking

The Core Skill component Critical Thinking at SCQF level 5 could be developed in this Unit. The general skill for this component is — *Analyse a situation or issue.* This component could be developed where a situation or issue has arisen in the course of your work or study. You would need to analyse and evaluate the situation or issue and devise a strategy to deal with it. You should reflect on and evaluate the success of the strategy. Alternatively, your tutor could provide a case study.

Problem Solving: Planning and Organising

The Core Skill component Planning and Organising at SCQF level 5 could be developed in this Unit. The general skill for this component is — *Plan, organise and complete a task*. This component could be developed through planning, organising and completing a task. You would need to develop a plan, identify and obtain the required resources and then carry out the task. Resources could include, for example, time available, paper work and documentation, set procedures, people and equipment. You must decide on how the task will be managed. This could include allocation of responsibilities in a group context. Planning and organising skills could be developed through the completion of home study, research and practical tasks.

Information and Communication Technology (ICT): Accessing Information

The Core Skill component Accessing Information at SCQF level 6 could be developed in this Unit. The general skill for this component is — *Use ICT independently to carry out complex searches across a range of tasks.* This component could be developed by carrying out searches and accessing information for tasks in the Unit. Research activities will help develop your skills in accessing information on a complex task.

General information for learners (cont)

Unit title: Electronic Fire and Security Systems: CCTV Installation (SCQF level 6)

Working with Others: Working Co-operatively with Others

The Core Skill component Working Co-operatively with Others at SCQF level 6 could be developed in this Unit. The general skill for this component is — *In complex interactions, work with others co-operatively on an activity and/or activities.* This component could be developed by gathering evidence from the workplace or by taking part in group activities in the centre. This could include, for example, joint information and feedback sessions, group research or practical activities.

Other Essential Skills developed through the completion of this Unit

- Time Management: through the completion of projects and research task you will learn new skills in how to manage your own time to help achieve a common goal.

Although not directly awarded, completion of the Modern Apprenticeship Award in electronic fire and security systems gives opportunities to apply for professional recognition through the Institute of Engineering Technology and successful recognition will result in the EngTech qualification being awarded.